

PAPER • OPEN ACCESS

## Potential and availability of feed in paddy fields for sustainable livelihoods of moving duck farmers in Pinrang regency South Sulawesi province

To cite this article: K Kasim *et al* 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **788** 012219

View the [article online](#) for updates and enhancements.

# Potential and availability of feed in paddy fields for sustainable livelihoods of moving duck farmers in Pinrang regency South Sulawesi province

K Kasim<sup>1</sup>, D Salman<sup>2</sup>, A R Siregar<sup>1</sup>, R A Nadja<sup>1</sup> and W Pakiding<sup>2</sup>

<sup>1</sup>Department of Socio Economic, Animal Science Faculty, Universitas Hasanuddin

<sup>2</sup>Department of Animal Production, Animal Science Faculty, Universitas Hasanuddin

E-mail: kasmihirdan@yahoo.co.id

**Abstract.** The purpose of this study was to determine the potential and availability of duck fodder in paddy fields that supports the sustainability of moving duck farmers' livelihoods. The research method used was measuring the type of food eaten by ducks in paddy fields after being harvested by tiling and cropping ducks. There were three types of local duck feed in paddy fields after harvesting that could be measured in this study, namely rice that was wasted and left behind on harvested stems (loses), golden snails and earthworms. The availability of feed based on dry weight, namely, paddy at 702.40 kg/hectare, golden snails at 251.20 kg/hectare and earthworms at 4 kg/hectare. The availability of feed in the form of golden snails was quite high, especially the fresh weight of 1.064 kg/hectare. Golden snails reproduced quickly when the fields were already inundated with water. The availability of feed in the form of earthworms is 40 kg/hectare. The results of the research from the harvesting of ducks released in the fields were the consumption of dry weight of feed of 53.24 g/duck. Thus, the estimated feed availability based on dry weight was 97.60 kg/hectare. So that one hectare of paddy fields could accommodate as many as 300 ducks for two months (60 days). For the sustainability of the availability of feed for ducks in the paddy fields after two months of grazing, it can be obtained from the fruit of paddy regrowth from paddy stalks/straw that live in paddy fields. Sources of food for ducks could also be obtained from grasses and small snails that have just hatched and several types of insects in the paddy fields. It concluded that the potential and availability of feed in the paddy fields after harvesting for ducks were still supportive. Therefore, it reduced the cost of feed for farmers.

## 1. Introduction

One of the poultry that supports the provision of food containing animal protein, both from eggs and meat, is ducks. More than 24.2% of the eggs in South Sulawesi are derived from duck eggs and contributed as a producer of meat by 2.2% [1]. The maintenance of ducks by means of moving for grazing in paddy fields is one of the particular uniqueness of egg duck production.

The maintenance system of egg duck production was carried out by farmers is mostly herded in harvested paddy fields and there are lots of scattered paddy fields [2]. Grazing ducks in harvested paddy fields can help farmers to reduce high costs for providing the feed. Duck farmers take an advantage of the time lag between the harvest season and the paddy planting season in the fields. There is a time limit on the use of paddy fields for grazing these ducks because it is influenced by the growing season so that duck farmers look for other paddy fields that have been harvested. The



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

utilization of paddy fields for grazing ducks is a maximum of 1.5 months. The presence of ducks in paddy fields can fertilize paddy soil and help farmers to eradicate rice plant pests, such as snails [3]. The activity of a group of ducks on the surface of the water and paddy soil at any time stimulates paddy tillers and duck manure to fertilize the fields [4-7]. This phenomenon is the same as the presence of large livestock whose feces can function as fertilizer [8].

Moving duck farming is practiced by the community in several areas in South Sulawesi, especially in the districts of Sidenreng Rapang, Pinrang, and Wajo. They move their livestock business between villages, between sub-districts, and between districts in South Sulawesi, and even outside South Sulawesi, by utilizing harvested paddy fields. The destinations areas for moving duck farming are Pinrang, Sidrap, Wajo, Barru, Maros, Gowa, Pangkep, Bone, Soppeng, Luwu Luwu Utara and Luwu Timur in South Sulawesi province and Polewali Mandar district in West Sulawesi province. Duck farmers keep their ducks on a moving basis due to limited grazing land and capital for purchasing duck feed [9].

The development of moving duck farming is supported by the climatological conditions of South Sulawesi which allow differences in rice harvest seasons between regions. The different harvest schedules allow breeders to move around throughout the year. The description of the agricultural area and the area of paddy fields in four districts in South Sulawesi which are predominantly occupied by duck grazing can be seen in table 1.

**Table 1.** Percentage of paddy field area to agricultural land area in Pinrang, Sidrap and Wajo Regencies in 2017.

Information	Pinrang regency	Sidrap regency	Wajo regency	Luwu Districts
Paddy area (ha)	55,111	48,512	100,354	33,234
Agricultural land area (ha)	77,086	65,956	150,903	61,209
% of paddy field area to agricultural land area	71.49	73.55	66.50	54.29

Source: Processed secondary data from Central Bureau of Statistics of South Sulawesi, 2018 [8].

In table 1, it can be seen that the largest area of agricultural land is Wajo regency, namely 150,903 ha, while the narrowest agricultural land area is Luwu regency with a total of 61,209 ha. The area of agricultural land consists of paddy fields, tegal/gardens, fields/huma, grazing/grass and some other land, namely yards planted with agricultural commodities. The largest percentage of paddy field area to agricultural land area was Sidrap regency, which was 73.55%, while the smallest was Luwu Regency with 54.29%. The largest percentage of paddy field area to agricultural land area is Sidrap regency because the agricultural land area is dominated by paddy field area.

This study aimed to analyze the potential and availability of feed contained in paddy fields as a place for ducks to access food during the transfer process. From the results of the analysis, it can be projected that the sustainability of the duck farming system will move from the aspect of the available feed content in the visited fields.

## 2. Method

To find out the availability of feed in paddy fields that have been harvested, the research used tiling with an area of 1 m<sup>2</sup>. The type and amount of feed that available in each tiling were calculated. For calculating feed/duck consumption, sample duck was slaughtered and residual feed in the crop was harvested and evaluated. During the evaluation, the type of feed eaten was observed and the amount of feed consumed by the ducks was calculated. The ducks that were taken as samples were ducks that had previously been fasted for 12 hours, then released for 10 hours grazing then the ducks were taken randomly.

### 3. Results and discussion

#### 3.1. The dependence of duck farmers on paddy fields

The natural capital accessed by duck farmers in paddy fields. The intended paddy field was land that has been harvested. The existence of harvested paddy fields can meet the availability of feed for ducks. The paddy that was wasted when farmers harvest was a source of income for moving duck farmers. If the paddy farmers got an abundance of paddy production, then the ducks got an abundant feed too. The term for duck farmers, if paddy farmers live, then duck farmers also live. The land that was controlled was rather extensive, ownership of 1000 ducks occupied paddy fields of 10 to 15 ha. The average moving duck farmer has a business scale of 500-1500 ducks. The types of ducks were local ducks. The age of the ducks were not uniform, there were ducks that have laid eggs, ducks and virgin ducks. Usually, moving duck farmers kept ducks that have laid eggs, in addition to raising ducks that have not laid eggs. Ducks that have spawned were reared four harvest cycles, after which they were sold.

Apart from paddy fields, the capital accessed by moving duck farmers was the availability of water resources. Water resources for duck farmers have a very important role for their ducks. The condition of the paddy fields which was designated for grazing ducks, the soil must be watery. The source of water was from rainwater, irrigation, pumping, wells, or other water sources. Even if there was plenty of food, if there was no water, ducks will not survive. Part of the water source was accessed from irrigation, thus supporting the living biota in paddy fields were the second source of food for ducks apart from paddy. In the dry season, ducks ate dry food and water was prepared in the basin. This condition caused the ducks did not lay eggs and only survived. Therefore, after harvesting, duck farmers try to contact the location determinant to drain water in the fields, so that the ducks get drinking water and soften the paddy soil so that the biota as a source of food for ducks other than paddy that were scattered after harvest could live, for example, small golden snails and earthworms.

#### 3.2. Potential and availability of feed for ducks in harvested rice fields

One of the measures of the sustainability of moving duck farming was the carrying capacity of the paddy fields occupied by grazing their ducks. We calculated the carrying capacity of the land by taking samples in paddy fields through tiling techniques. The results of the identification of the availability of duck feed at the paddy fields location can be seen in table 2.

**Table 2.** Availability of local duck feed in paddy fields after harvesting.

Type of feed*	Wet weight (kg/Ha)	Dry weight(kg/Ha)
Paddy	820.80	702.40
Golden Snails	1.064.00	251.20
Earthworms	97.60	4.00
Total	1.982.40	957.60

\*result of tiling (tiling size 1 m x 1 m)

Source: Processed primary data, 2017.

Table 2 showed that there were three types of local duck feed in paddy fields after harvesting that can be measured in this study, namely paddy that was wasted and left on the stems (loses) of harvest, golden snails, and earthworms. The types of animals and plants that ducks can eat, such as insects and grasses, were not measured. The availability of feed based on dry weight, namely, paddy at 702.40 kg/ha, golden snails at 251.20 kg/ha, and earthworms at 4 kg/ha.

Paddy fields in Sidenreng Rappang regency range from 7.36 tonnes to 11.2 tonnes of harvested dry unhulled paddy per hectare. The rate of rice loss that occurs at harvest reached 10% [10]. The loss of rice due to the harvest can be a source of food for ducks that were roasted in paddy fields.

The availability of feed in the form of golden snails was quite high, especially the fresh weight of 1.064 kg/ha. Golden snails reproduced quickly when they were in flood condition. Golden snails stored the eggs on the remaining rice stalks after harvesting. However, most of the availability of golden snails could not be eaten by ducks, because they have a hard shell. The availability of feed in the form of earthworms was 97.60 kg/ha which can be taken and calculated based on tiling. Earthworm sampling was still lacking because the paddy soil has not been inundated for a long time so the soil was not soft yet. The requirements for earthworms to live if the conditions of the rice fields were soft and tough.

### 3.3. Types of feed eaten by ducks in paddy fields

To see the type of feed eaten by ducks at the movement location, it can be done by taking a sample of two ducks in the fields that were temporarily grazing. Before being released in the fields, the ducks fasted for 12 hours, then the ducks were released for 10 hours in the paddy fields to look for food. After that, the ducks were caught and immediately slaughtered, and then their crop was taken. Types and estimates of the amount of feed consumed by ducks were shown in table 3.

**Table 3.** Types and estimates of the amount of feed consumed (g/head) based on wet weight and dry weight.

Type of feed	Wet weight (g/duck)	Dry weight (g /duck)	% type of feed consumed (dry weight basis)
Paddy <sup>*)</sup>	78.36	51.72	97.15
Golden snail <sup>*)</sup>	2.18	1.20	2.25
Straw/rice grain stalk <sup>*)</sup>	0.44	0.32	0.60
Earthworms	-	-	-
Total consumption	80.98	53.24	100

<sup>\*)</sup>the average results of the measurement of cache content per duck grazing in the field, and - = cannot be measured.

Source: Processed primary data, 2017.

The type of feed that was mostly eaten by ducks was paddy/grain that was left behind and wasted at harvest time. This was because rice has high palatability for ducks. Then the largest portion eaten by ducks after paddy was the golden snail. However, the golden snail has a limitation, namely a hard and sharp shell after breaking. This affected digestibility and injured the digestive tract. Ducks only consumed small snails. The paddy straw eaten by ducks has a small portion because it was only eaten with paddy. The feed in the form of earthworms could not be seen because it has a small portion and has been mixed with other types of feed. The types of food such as insects and grasses have not been found in the duck crop. This was because the food supplies in the form of rice and small snails were still available so that the ducks have not consumed feed from grasses.

Table 3 showed that the dry weight consumption of feed was 53.24 g/head. Thus the estimated feed availability based on dry weight was 957.60 kg/ha. It was estimated that one hectare of rice fields accommodated as many as 300 ducks for 2 months (60 days). For the sustainability of the availability of feed for ducks in paddy fields after 2 months of grazing, it can be obtained from the fruit of paddy regrowth from rice stalks/straw that live in paddy fields. Sources of food for ducks can also be obtained from grasses and small snails that have just hatched and several types of insects in the rice fields.

#### 4. Conclusion

The potential and availability of feed in paddy fields after harvesting for ducks were sufficiently available and the presence of this feed reduced the feed costs for duck farmers. One hectare of rice fields provided feed for ducks for two months for a population of 300 ducks.

#### Acknowledgment

The authors would like to thank the Faculty of Animal Science, Universitas Hasanuddin for providing research facilities.

#### References

- [1] Pertanian K 2018 *Statistik Peternakan dan Kesehatan Hewan* (Jakarta: Direktorat Jenderal Peternakan dan Kesehatan Hewan)
- [2] Kasim K, Salman D, Siregar A R, Nadja R A and Ahmad A 2019 Vulnerability and adaptive strategies on duck breeder in Pinrang district, Indonesia *IOP Conf. Ser. Earth Environ. Sci.* **235** 012046
- [3] Kasim K, Salman D, Siregar A R, Nadja R A, Rahmadani and Hastang 2020 The dynamics of Livelihood Assets on Moving Duck Farmers *International Journal Advanced Science Engineering Information Technology* **10** 2088–5334
- [4] Zhang J E, Xu R, Chen X and Quan G 2009 Effects of duck activities on a weed community under a transplanted rice–duck farming system in southern China *Weed Biology and Management* **9** 250–7
- [5] Furuno T 2015 *The Power Of Duc-A review* (Australia: The Permaculture Research Insitute)
- [6] Suh J 2014 Theory and reality of integrated rice–duck farming in Asian developing countries: A systematic review and SWOT analysis *Agricultural Systems* **125** 74–81
- [7] Li M, Li R, Zhang J, Wu T, Liu S, Heia Z and Qiua S 2020 Effects of the integration of mixed-cropping and rice–duck co-culture on rice yield and soil nutrients in southern China *Journal Society of Chemical Industry Food Agric.* **100** 277–86
- [8] Syam J, Salman D, Siregar A R and Arsyad M 2019 Adaptive strategies of livestock waste processing technology to vulnerability availability of animal feed *IOP Conf. Ser. Earth Environ. Sci.* **235** 012094
- [9] Nurhudayah N, Arifin A and Sadat M A 2018 Faktor-faktor yang mempengaruhi penawaran jagung di Sulawesi Selatan *Jurnal Agribis.* **8** 36–48
- [10] Sihombing M A E M and Samino S 2015 Daya repelensi biopestisida terhadap walang sangit (*Leptocoris oratorius*, fabricus) di laboratorium Biotropika *J. Tropic. Biol.* **3** 99–103